

REMARKS

Claims 1-12, 14, 16, and 17 are pending in this application. No amendment has been made.

Double Patenting

I. Claims 1-12 and 14 were rejected on the ground of double patenting over claim 1 of U.S. Application No. 10/530,199 (“the ‘199 application”). Applicants respectfully traverse the rejections.

Present claim 1 recites an electrolyte membrane-electrode assembly comprising a pair of electrodes and a hydrocarbon-based solid polymer electrolyte membrane formed using a poly(arylene ether)-based compound including a constituent represented by general formula (1) and a constituent represented by general formula (2), wherein the glass transition temperature of the electrolyte membrane in a dry state is not lower than 160°C and the maximum water content (Wm) of the electrolyte membrane is within the range of from 10% to 45% or 70 to 120%. Claim 1 of the ‘199 application recites a polyarylene ether-based compound comprising polymer components having general formula (1) and general formula (2). The polyarylene ether-based compound of the ‘199 application is only one of the starting materials for making the electrolyte membrane-electrode assembly recited in present claim 1. Because the product according to present claim 1 is different from the product according to claim 1 of the ‘199 application, the claims do not conflict and there should be no double patenting. Indeed, an electrolyte membrane-electrode assembly, as recited in present claim 1, is an invention that is of a different category from a polyarylene ether-based compound, as recited in claim 1 of the ‘199 application. Therefore, present claim 1 should not be rejected on the ground of double patenting over claim 1 of the ‘199 application.

In addition, present claim 1 recites an electrolyte membrane-electrode assembly wherein the maximum water content (Wm) of the electrolyte membrane is within the range of from 10% to 45% or 70 to 120%. Prior to the

present invention, it was difficult to produce a durable and reliable electrolyte membrane-electrode assembly wherein the maximum water content (Wm) of the electrolyte membrane is within the range of from 10% to 45% or 70 to 120%. For example, an electrolyte membrane having a maximum water content of from 10% to 45% tends to repel an electrode due to its hardness. Even if the electrolyte membrane is forced to form a joint with an electrode at high temperatures, the electrode would come off after a period of time and the electrolyte membrane-electrode assembly would have problems such as reduced durability, degradation such as color change of the membrane, and embrittlement of the membrane. See specification, page 12, line 28 to page 13, line 6. In addition, an electrolyte membrane having a maximum water content of from 70 to 120%, which tends to deform due to its high content of acidic functional groups and large space for retaining water, can not be joined with an electrode simply by hot pressing. See specification, page 13, lines 11-15.

Despite the above-described difficulty, applicants managed to develop the claimed electrolyte membrane-electrode assembly wherein the electrolyte membrane has a maximum water content within the range of from 10% to 45% or 70 to 120%. The claimed electrolyte membrane-electrode assembly exhibits high reliability and durability with improved joints between the electrodes and the electrolyte membrane. On the other hand, claim 1 of the '199 application merely recites a polyarylene ether-based compound but fails to teach or suggest an electrolyte membrane-electrode assembly wherein the electrolyte membrane has a maximum water content within the range of from 10% to 45% or 70 to 120%, as recited in present claim 1.

The Office Action states that an apparatus claim must be distinguished from the prior art in terms of structure rather than function. See Office Action, page 3, lines 5-6. Here, the structure of the membrane-electrode assembly of present claim 1 already distinguishes the claimed invention from the product according to claim 1 of the '199 application. A person of ordinary skill in the art would understand that the electrolyte membrane-electrode assembly of present claim 1, comprising a pair of electrodes and a hydrocarbon-based solid polymer

electrolyte membrane, has a different structure than the polyarylene ether-based compound recited in claim 1 of the '199 application.

For at least these reasons, withdrawal of the double-patenting rejections is respectfully requested.

II. Claim 2 was rejected on the ground of double patenting as being obvious over claim 1 of the '199 application in combination with Inoue et al. (US 2001/0044042). Applicants respectfully traverse the rejection.

The deficiency of claim 1 of the '199 application, as discussed above, is not cured by Inoue. For example, claim 1 of the '199 application, in combination with Inoue, does not teach or suggest an electrolyte membrane-electrode assembly wherein the maximum water content (Wm) of the electrolyte membrane is within the range of from 10% to 45% or 70 to 120%. Withdrawal of the double patenting rejection is respectfully requested.

CONCLUSION

The Examiner is encouraged to contact the undersigned regarding any questions concerning this amendment. In the event that the filing of this paper is deemed not timely, applicants petition for an appropriate extension of time. The Commissioner is authorized to debit Deposit Account No. 11-0600 the petition fee and any other fees that may be required in relation to this paper.

Respectfully submitted,
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